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10/656,613	09/04/2003	Joseph H. Johnson	05-022con/Tank-190con	7994

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Boris G. Tankhilevich
Law Offices of Boris G. Tankhilevich
Suite A
536 N. Civic Drive
Walnut Creek, CA 94596

EXAMINER

QUINTO, KEVIN V

ART UNIT	PAPER NUMBER
2826	

SHORTENED STATUTORY PERIOD OF RESPONSE	MAIL DATE	DELIVERY MODE
3 MONTHS	03/22/2007	PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

If NO period for reply is specified above, the maximum statutory period will apply and will expire 6 MONTHS from the mailing date of this communication.

Office Action Summary	Application No. 10/656,613	Applicant(s) JOHNSON ET AL.	
	Examiner Kevin Quinto	Art Unit 2826	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 14 December 2006.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 2-12, 14-19, 24, 32, 33 and 35-50 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☒ Claim(s) 32, 33 and 42-50 is/are allowed.
- 6) ☒ Claim(s) 2-8, 24 and 35-41 is/are rejected.
- 7) ☒ Claim(s) 9-12 and 14-19 is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
 2. ☐ Certified copies of the priority documents have been received in Application No. _____.
 3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | 5) <input type="checkbox"/> Notice of Informal Patent Application |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08)
Paper No(s)/Mail Date _____ | 6) <input type="checkbox"/> Other: _____ |

DETAILED ACTION

Response to Arguments

1. Applicant's arguments with respect to claims 2, 5-12, 14-19, 24, 35, and 38-41 have been considered but are moot in view of the new ground(s) of rejection.

Claim Rejections - 35 USC § 102

2. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

3. Claims 2, 5-8, 24, 35, and 38-41 are rejected under 35 U.S.C. 102(e) as being anticipated by Torvik et al. (United States Patent Application Publication No. US 2003/0094672 A1).
4. In reference to claim 2, Torvik et al. (United States Patent Application Publication No. US 2003/0094672 A1, hereinafter referred to as the "Torvik" reference) discloses a structure which meets the claim. Figures 1 and 2 of Torvik disclose a silicon carbide based silicon structure comprising a silicon carbide substrate (20), a layer (19, 51) overlying the silicon carbide substrate (20) and a single crystal silicon semiconductor material (11, 13, 52, 53) having a top surface. The single crystal silicon semiconductor

Art Unit: 2826

material (11, 13, 52, 53) overlays the layer (19, 51). The single crystal silicon semiconductor material (11, 13, 52, 53) is connected to the silicon carbide substrate (20) via the layer (19, 51). The silicon carbide substrate (20) is of a conductivity type selected from the group consisting of a first conductivity type and a second conductivity type. The silicon carbide substrate (20) has a first dopant concentration. The single crystal silicon semiconductor material (11, 13, 52, 53) is of a conductivity type selected from the group consisting of the first conductivity type and the second conductivity type. The single crystal silicon semiconductor material (11, 13, 52, 53) has a second dopant concentration. The examiner notes the limitation that the layer between the single crystal silicon semiconductor material and the silicon carbide substrate is a bonding layer. However this places claim 2 into the form of a **product-by-process claim**:

Note that a "product by process" claim is directed to the product per se, no matter how actually made, *In re Hirao*, 190 USPQ 15 at 17 (footnote 3). See also *In re Thorpe*, 227 USPQ 964, 966; *In re Luck*, 177 USPQ 523; *In re Fessmann*, 180 USPQ 324; *In re Avery*, 186 USPQ 161; *In re Wertheim*, 191 USPQ 90 (209 USPQ 554 does not deal with this issue); and *In re Marosi et al.*, 218 USPQ 289, all of which make it clear that it is the patentability of the final product per se which must be determined in a "product by process" claim, and not the patentability of the process, and that an old or obvious product produced by a new method is not patentable as a product, whether claimed in "product by process" claims or not. Note that applicant has the burden of proof in such cases, as the above case law makes clear. See also MPEP 2113.

Claim 2 is not patentably distinguishable from the Torvik reference regardless of the process used to form the silicon carbide based silicon structure because only the final product is relevant, and not the process of making such as bonding the single crystal silicon semiconductor material and the silicon carbide substrate with a bonding layer.

5. With regard to claims 5 and 8, Torvik discloses that the silicon carbide substrate (20) is p-type and the single crystal silicon semiconductor material (11, 13, 52, 53) is n-type (p. 2, paragraphs 25 and 33)

6. In reference to claims 6 and 7, Torvik makes it clear that the conductivity types of the silicon carbide substrate (20) and the single crystal silicon semiconductor material (11, 13, 52, 53) may be switched (p. 3, paragraph 39).

7. In reference to claim 24, Torvik (United States Patent Application Publication No. US 2003/0094672 A1) discloses a structure which meets the claim. Figures 1 and 2 of Torvik disclose a silicon carbide based silicon structure comprising a silicon carbide substrate (20), and a single crystal silicon semiconductor material (11, 13, 52, 53) having a top surface which overlies the silicon carbide substrate (20). The silicon carbide substrate (20) is of a conductivity type selected from the group consisting of a first conductivity type and a second conductivity type. The silicon carbide substrate (20) has a first dopant concentration. The single crystal silicon semiconductor material (11, 13, 52, 53) is of a conductivity type selected from the group consisting of the first conductivity type and the second conductivity type. The single crystal silicon semiconductor material (11, 13, 52, 53) has a second dopant concentration. The first conductivity of the silicon carbide substrate is p-type (p. 2, paragraph 25). The examiner notes the limitation regarding the growth of single crystal silicon on the silicon carbide substrate. However this places claim 24 into the form of a **product-by-process claim**:

Note that a "product by process" claim is directed to the product per se, no matter how actually made, *In re Hirao*, 190 USPQ 15 at 17 (footnote 3). See also *In re Thorpe*, 227 USPQ 964, 966; *In re Luck*, 177 USPQ 523; *In re Fessmann*, 180 USPQ 324; *In re Avery*, 186 USPQ 161; *In re Wertheim*, 191 USPQ 90 (209 USPQ 554 does not deal with this issue); and *In re Marosi et al.*, 218 USPQ 289, all of which make it clear that it is the patentability of the final product per se which must be determined in a "product by process" claim, and not the patentability of the process, and that an old or obvious product produced by a new method is not patentable as a product, whether claimed in "product by process" claims or not. Note that applicant has the burden of proof in such cases, as the above case law makes clear. See also MPEP 2113.

Claim 24 is not patentably distinguishable from the Torvik reference regardless of the process used to form the single crystal silicon because only the final product is relevant, and not the process of making such as growing the single crystal silicon on the silicon carbide substrate.

8. In reference to claim 35, Torvik (United States Patent Application Publication No. US 2003/0094672 A1) discloses a structure which meets the claim. Figures 1 and 2 of Torvik disclose a silicon carbide based silicon structure comprising a silicon carbide substrate (20), a double layer (15, 19, 53, 51) overlying the silicon carbide substrate (20) and a single crystal silicon semiconductor material (11, 13, 52) having a top surface. The single crystal silicon semiconductor material (11, 13, 52) overlays the double layer (15, 19, 53, 51). The single crystal silicon semiconductor material (11, 13, 52) is bonded to the silicon carbide substrate (20) via the layer (15, 19, 53, 51). The silicon carbide substrate (20) is of a conductivity type selected from the group consisting of a first conductivity type and a second conductivity type. The silicon carbide substrate (20) has a first dopant concentration. The single crystal silicon semiconductor material (15, 19, 53, 51) is of a conductivity type selected from the group consisting of the first conductivity type and the second conductivity type. The single crystal silicon semiconductor material (15, 19, 53, 51) has a second dopant concentration. The examiner notes the limitation that the double layer between the single crystal silicon semiconductor material and the silicon carbide substrate is a double bonding layer.

However this places claim 35 into the form of a **product-by-process claim**:

Note that a "product by process" claim is directed to the product per se, no matter how actually made, *In re Hirao*, 190 USPQ 15 at 17 (footnote 3). See also *In re Thorpe*, 227 USPQ 964, 966; *In re Luck*, 177 USPQ 523; *In re Fessmann*, 180 USPQ 324; *In re Avery*, 186 USPQ 161; *In re Wertheim*, 191

Art Unit: 2826

USPQ 90 (209 USPQ 554 does not deal with this issue); and *In re Marosi* et al., 218 USPQ 289, all of which make it clear that it is the patentability of the final product per se which must be determined in a "product by process" claim, and not the patentability of the process, and that an old or obvious product produced by a new method is not patentable as a product, whether claimed in "product by process" claims or not. Note that applicant has the burden of proof in such cases, as the above case law makes clear. See also MPEP 2113.

Claim 35 is not patentably distinguishable from the Torvik reference regardless of the process used to form the silicon carbide based silicon structure because only the final product is relevant, and not the process of making such as bonding the single crystal silicon semiconductor material and the silicon carbide substrate with a double bonding layer.

9. With regard to claims 38 and 40, Torvik discloses that the silicon carbide substrate (20) and the single crystal silicon semiconductor material (11, 13, 52, 53) are p-type (p. 2, paragraphs 25 and 33)

10. In reference to claims 39 and 41, Torvik makes it clear that the conductivity types of the silicon carbide substrate (20) and the single crystal silicon semiconductor material (11, 13, 52, 53) may be switched to n-type (p. 3, paragraph 39).

Claim Rejections - 35 USC § 103

11. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

12. Claims 3 and 4 are rejected under 35 U.S.C. 103(a) as being unpatentable over Torvik et al. (United States Patent Application Publication No. US 2003/0094672 A1).

13. In reference to claims 3 and 4, Torvik does not disclose the exact dopant concentrations for the single crystal silicon semiconductor material and the silicon carbide substrate. However:

Generally, differences in concentration or temperature will not support the patentability of subject matter encompassed by the prior art unless there is evidence indicating such concentration or temperature is critical. "[W]here the general conditions of a claim are disclosed in the prior art, it is not inventive to discover the optimum or workable ranges by routine experimentation." In re Aller, 220 F.2d 454, 456, 105 USPQ 233, 235 (CCPA 1955).

Therefore, claims 3 and 4 are not patentably distinguishable from the Torvik reference.

14. Claims 36 and 37 are rejected under 35 U.S.C. 103(a) as being unpatentable over Torvik et al. (United States Patent Application Publication No. US 2003/0094672 A1).

15. In reference to claims 36 and 37, Torvik does not disclose the exact dopant concentrations for the single crystal silicon semiconductor material and the silicon carbide substrate. However:

Generally, differences in concentration or temperature will not support the patentability of subject matter encompassed by the prior art unless there is evidence indicating such concentration or temperature is critical. "[W]here the general conditions of a claim are disclosed in the prior art, it is not inventive to discover the optimum or workable ranges by routine experimentation." In re Aller, 220 F.2d 454, 456, 105 USPQ 233, 235 (CCPA 1955).

Therefore, claims 36 and 37 are not patentably distinguishable from the Torvik reference.

Allowable Subject Matter

16. Claims 32, 33, 42-50 are allowed.

17. Claims 9-12 and 14-19 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

18. The following is a statement of reasons for the indication of allowable subject matter: the reasons for allowance were cited in a previous Office action.

Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Kevin Quinto whose telephone number is (571) 272-1920. The examiner can normally be reached on M-F 8AM-5PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Sue Purvis can be reached on (571) 272-1236. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

KVQ


LEONARDO ARDUJAR
PRIMARY EXAMINER